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V. ELECTRICITY, LIGHT HEAT, ETC.—On the Minute Measurements of Modern Science. By Alfred M. MAYER. Article XIII. On the Application of Rotating Mirrors to the Measurement of Minute Lengths, Angles, and Times. The application of Saxton's Mirrorto the Observation and Measurement of the changes in the dimensions of Iron and Steel Bars on their Magnetization. The Heating of Iron on Demagnetization. Interesting experiments on the elongation of Rods by Electric Currents, with Table and I illustration.—Density of Vapors.—Science Notes. Death of a Famous Gorilla.—Remarkable Gems.—Yorkshire College of Science.

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The East India Worm, with 1 illustration.—DR. E. VON BARY.

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NATURAL HISTORY COLLECTIONS AS EDUCATORS.

Park, in this city, on the model of that in Regent's Park, in by lights for ordinary night use. London, England, is again being brought forward. A one free day per week.

humane society. The public however continue to manifest, be less than in the other. great interest in the collection, and to this fact, coupled During fogs steamers usually blow their whistles at inprise above noted.

natural history specimens, whether the same be of living tack. animals or of fossil remains, are valuable only in an educational regard; and if the same are intended for popular edification, then, unless they are so arranged as to carry the proper scientific instruction to unscientific intellects, they do not fulfill their purposes. This is a simple and very necessary requirement, yet it appears to be systematically tory interest felt in looking at strange objects for the perma-Aquarium, for example, in this city, established a year ago, prove very remunerative to the inventor. contains a really remarkable collection of marine creatures and it is especially rich in curious connecting links. The visi- CARBON BURNED IN AN ELECTRO-CHEMICAL BATTERY. tor may begin with the animated plants, the zoöphytes, trace the development up to the tubellaria and gliding worms, and so on, through the eels and similar types to the true fish. Still advancing, he may find in the green maray perhaps the closest menopome and the axolotl, the links between the gill-breathing and the air-breathing animal; in the seals and sea lions the links between the warm-blooded land creatures and the ing him, and the accessories being so arranged as to convey In accordance with this plan, the fish are disposed so that salt. in the upper story those creatures always found at or near intermediate regions being between.

convey a general notion of our idea of what the project should be. That is to say, the animals should be put in en- of the metals on the non-attackable electrode. closures imitating as closely as possible their natural haunts; tions of fossils, shells, insects, stuffed animals, minerals, or koff proposes to store up and use as motive power. other geological specimens, or herbariums should likewise be exhibited in the full meaning of that term, not merely ticketed with a Latin label and put in a glass case. It will interests the public to carry out the ideas above indicated; but we believe that such naturalists as Professors Agassiz, alike to its founders and to the metropolis.

## PREVENTING COLLISIONS AT SEA.

signal to other ships in her vicinity the course which she is steering, so that collisions may thus be avoided. The means at present used to this end are very inadequate, as is abundantly proved by the frequency with which collisions occur. mined by the position of her lights. It will be evident that are moved with the hand from left to right, thus steadying

an invention of the kind needed must combine some sound-The project of establishing a Zoölogical Garden in Central ing apparatus for fogs and some new method of signalling

At the present time, sailing ships under way at night carry number of wealthy citizens have formed a Zoölogical Society; a green light on the starboard and a red light on the port and propose to start with a capital of over \$100,000. The side. These lanterns are so arranged as to throw their illudesignated ground is a tract of 20 acres on the west side of mination over an arc of 90° to the fore and aft axis of the the park, just above 96th street and near the new Natural vessel. Steamers carry in addition a white mast headlight. History Building. The society will enclose the site, erect By the relative position of these lights the pilot of an apbuildings, etc., and charge a small admission fee except on proaching vessel determines which way to steer. If for example he sees a red light only, he knows the other vessel is The collection of living animals already in the park is now, crossing his bows and moving from right to left, if a green very meagre. Lack of funds at the disposal of the authori- light she is moving in the opposite direction, if both lights ties have prevented its enlargement or even the erection of are visible she is coming directly bows on. This however is suitable edifices for its reception, and in fact, as the Presi-very inaccurate, for the moment the coming vessel steers at a dent of the Park Commission expresses it, the city keeps "a slight angle from direct approach, then one or the other of kind of hotel for menageric animals," which belong to her side lights immediately becomes invisible. The apshows and circuses, and for which care and housing are pro- proaching helmsman, then, has no way of telling at what vided, the owners paying only for food. The condition of angle the other vessel is moving, whether she be directly these unfortunate brutes has of late been pitiable, and has crossing his bow, or at 90° to his own keel, or at a very much elicited no small share of the attention of Mr. Bergh and his smaller angle. In one case the chances of collision would

probably with the recent opening of the new Museum of tervals; they also blow one or two sharp blasts on approach-Natural History, may be ascribed the renewing of the enter- ing another vessel, according as they mean to go to one hand or the other. A sailing vessel during a fog sounds her bell It is perfectly obvious, we think, that collections of or blows a fog horn, according as she is on one or the other

It is clear that these very rough means of denoting position leave a great deal to the guess work or judgment of the helmsman, much more indeed than would be the case did a good system of signals exist, by which a vessel, by sound or by lights or by a combination of both, could indicate her course. One signal for each point of the compass would neglected, with the result of substituting merely the transi- be needed, making 32 in all, and the requirements would be simplicity, clearness, and readiness in changing one signal nent one which might be aroused if their inter-connection for another. A really efficient set of such signals would and intrinsic peculiarities were more clearly set forth. The probably be adopted by all maritime nations and would

It seems probable that when the discovery shall have been made of how to oxidize carbon in the galvanic battery, the cheapest source of electricity will have been attained. The most economical means of producing a current now known link between the fish and the serpent; in the proteus, the is by the magneto electric machine driven by a steam engine, the energy of the coal being converted into electricity with less proportionate waste than under any other circumstances.

M. Jablochkoff, the inventor of the electric candle, has cold-blooded inhabitants of the sea; in the flying foxes lately been experimenting upon a battery wherein carbon is the link between birds and brutes; and thus he may con- to be consumed. From the note describing the same, which tinue tracing the chain of development as demonstrated by he contributes to the French Academy of Sciences, he ap-Haeckel and other evolutionists. In the kingyo and the other pears chiefly to have renewed the experiments of Crookes, curious Japanese fish he may see the wonderful results of ar- and the results which he reports are, therefore, to be astificial selection carried on through a long number of years; cribed to the addition of certain metallic salts, which must in one fish he will find eyes developed until they look like exercise a potent effect toward increasing the power of his small telescopes; in another tail and fins converted into films pile. Crookes' battery, in which carbon is oxidized, conwhich resemble festoons of lace. This is the merest outline sists of an iron ladle, which serves both as a containing vesof some important lessons which might be learned by mere sel and as the non-attackable electrode. In this he melts inspection if the opportunity were provided say by suita- nitrate of potash, and into the liquid thus produced he bly arranging the collection and posting explanatory placards. plunges his carbon. The oxygen in the nitrate with the Another lesson is taught in an admirable way by the plan on carbon produces carbonic acid, which unites with the rewhich the famous Berlin Aquarium is constructed. There the maining potash, forming carbonate of potash, and by the visitor descends from story to story, tanks always surround-chemical action a current of electricity, which "affects the galvanometer," is liberated. A better current is obtained the idea that he is actually going down in the sea depths, by a plate of platinum placed with the carbon in the fused

Jablochkoff's new plan is essentially the same. He rethe surface are met with, while in the lowest, the deep sea jects the platinum in favor of iron alone, and suspends his fishes and crustaceans are encountered, those dwelling in carbon in a wire basket in the liquid; but he says by adding different metallic salts he is enabled to vary the power of To return to the Zoölogical Garden plan, the above will the battery and the rapidity of expenditure of carbon, and with these salts there is received a galvano-plastic deposit

The electro-motive force of the battery varies between 2 they should be allowed the utmost freedom of movement and 3 units, according to the nature of the metallic salts compatible with safety; their relative arrangement should be used, and is, therefore, superior to that of the Bunsen or such as to indicate their relationships and descents in the Grenet elements. The Bunsen pile gives at maximum 1.8 clearest possible manner to the average intellect, and brief units, and the Grenet 2, or under best conditions, 2.1 units. information regarding each specimen in simple language During the working of the battery, there is a large disenshould be placed conspicuously upon its enclosure. Collec- gagement of carbonic acid and other gases, which M. Jabloch-

#### ----DRAWING ON THE BLACKBOARD.

The chalk used should be square in section, so that, when require considerable ability and a full apprehension of what desired, a line of uniform width can be obtained, which is difficult, if not impossible, with conical-shaped pieces of chalk. A short wooden chalk or crayon holder with a bunch Bickmore, Marsh, or Morse are fully equal to the task, and of wash-leather, chamois skin, or soft cloth, is a good device the result would be a Natural History Museum creditable for keeping the fingers free from chalk, and erasing lines. Blackboard compasses and "straight edges" of different lengths prove useful to those inexpert in drawing circles, curves, and straight lines by the eye, but constant care and An invention of some sort is needed whereby a vessel may practice will, in course of time, enable the delineator to dispense with frequent use of them. They should be used as seldom as possible.

Vertical lines should be drawn from above downwards; the weight of the hand and arm should be allowed to fall The conditions to be considered are, first, those under which naturally. The delineator should stand with his right neither approaching vessel can see the other, as in the case shoulder opposite the vertical line to be drawn Horizontal of thick weather by day or night, and second, those always lines are made with the greatest facility when a fixed and existing after nightfall when a ship's whereabouts is deter- ifirm point has been made to the left, and the arm and body